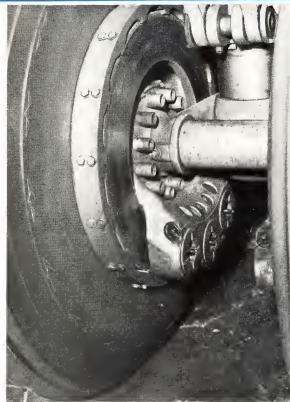


AVIATION WEEK

A MCGRAW-HILL PUBLICATION

APRIL 2, 1951

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NEWS DIGEST

DOMESTIC

Shipments of complete civil aircraft rose to 341,300 lb. of airframe weight in January, compared with 329,750 lb. for the same period last year. In the first month of this year, 335 civil planes were shipped, valued at \$4.9 million compared with Dec. 1950's shipment of 305 planes worth \$5 million. Total horsepower of civil airplane engines shipped during Jan. 1951 came to 151,181, while the previous month's was 151,300 lb. Civil engine horsepower shipped in Jan. 1951 was 140,366.

Los Angeles Airways conference would be entered for seven terms and be amended to permit carriage of passengers under recommendation of CAA executive Ferdinand D. Moran.

Fairchild Engine and Airplane Corp. has received a new Air Force order for C-119 Pilgrims, to be built at the Hagerstown, Md., plant.

USAF Douglas C-124A crashed some 500 mi. off the Irish coast while on a routine flight from the U.S. to Boston carrying 45 passengers and crew of five. Aboard were four SAC HQ officers, also Brig. Gen. Paul T. Callan, deputy commander of the Second AF, Detachable AFHQ, at present, no survivors had been located, nor had the cause of the disappearance been determined.

Atomic Energy Commission has officially acknowledged that it is negotiating with GE to develop a nuclear reactor for aircraft. AEC said that the nuclear reactor development would "assist the development of advanced propulsion devices for which the Air Force has previously announced contract negotiations with General Electric." No other details were disclosed.

Kenneth L. Voss, former director for transportation for Los Angeles Chamber of Commerce, has been named director of military traffic services, Department of Defense. He will be responsible for coordination and controlling all air and rail transportation needs of the three military departments during World War II if he was traffic manager for Commerce.

Shipment of 251 personnel and equipment planes during February by ten manufacturers brought \$1,410,000, according to AIA. Export of 32 planes,

valued at \$153,400, during February was made by nine companies.

North American Aviation, Inc. will build A-1 Navy attack planes at its new Columbus, Ohio, plant, beginning next year. It now is testing Columbus for production of Navy P-2 fighters.

Das R. Hudson, Birmingham, assistant executive and head of that city's aviation planning board, has been assigned as special consultant to the procurement division in the Office of Small Business, NPA, Department of Commerce. His responsibility will be to organize a field force to work with federal procurement agencies, prime contractors and subcontractors in clearing defense work to small firms.

FINANCIAL

Solar Aircraft Co. reported net sales of \$16,678,810 for the last nine months period ending Jan. 31, 1951. Net income for the same period is listed as \$567,156.

Delta Air Lines has declared a 25 cents dividend payable Apr. 17 to stockholders of record Apr. 7. Company reported net profit of \$375,129 after taxes for January and February, its combined with \$59,240 in same period last year. Operating revenues were \$4,061,179 for the two months, up 37 percent over the same 1950 period. Passenger business was up 43 percent so far this year with indication of more growth gains for March.

Texas Energy & Mfg. Co. Dallas, declared the regular quarterly dividend of five cents a share on the common stock payable Mar. 31 to stockholders of record Mar. 23.

Republic Aviation Corp. reports profit after taxes of \$2,517,500 on an income of \$7,944,875 for the year ending Dec. 31, 1950. Year-end backlog was \$245 million and orders since then have pushed it above \$300 million.

INTERNATIONAL

Latam (Colombia) DC-3 crashed near Cartagena, killing all 24 passengers and crew of three. Cause was not determined.

Argentine State Airline DC-3 crashed in Tierra del Fuego, Argentina, killing 11 aboard.

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CHANNEL ISOLATOR
LETS EACH PILOT CHOOSE HIS OWN INPUT SIGNALS AND USE EITHER SPEAKER OR HEADSET



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The ARC audio channel isolator permits two pilots to select 10 input channels in any combination, independently of each other—without cross-coupling interference. Radio functions can be delegated so that each pilot works at peak efficiency in complex navigation and communication situations. A flick of a switch changes from headphones to speaker—without disconnection and pilot fatigue. Write for details.

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WHO'S WHERE

In the Front Office

H. W. Ross has been appointed vice president of Canadian Pacific Air Lines. Ross, who started his flying career with the Royal Flying Corps in World War I, has been executive assistant to the president of CPA since the carrier set up its trans-Pacific service to Australia and the Orient.

James G. Fyvie, Jr. has left American Airlines where he was senior engine department director to join Collins Radio Co., Cedar Rapids, Iowa, as an executive capacity. He will function as head of Collins' general operations group in a new assignment. Fyvie had been vice president operations of AOA up to its merger with TWA. While with AOA he worked as changing the carrier's flying base out to headquarters.

Changes

Harry J. Janszka, formerly a project engineer with Fairchild Aircraft division, has been named chief copy for Lockheed Aircraft Co., L. J. N. Y.

W. H. DeLancey has been appointed director of engineering department at Westinghouse Electric's Westinghouse Manufacturing division and **C. F. Longmire** is now director of the Westinghouse equipment department.

Robert Monroe has been named director of materials for Western Products, Inc., which will be moved to **E. W. Kuchel**, who retired in February.

Henry M. Carroll has been added as Wichita, Kan., area representative for the "old" General of General Motors Corp.

Clarence B. Rott, has joined Ingersoll Rand Corp. as controller. **Robert G. Janszka** has been made divisional systems manager at Glenn L. Martin and Glenn A. Essex now heads the company's tool manufacturing department.

Honors and Elections



EYNSBUCK TAKES THE OATHS—Robert Eynsbuck, Air Transport Union, executive vice president, is now during the ceremony standing in new position as chairman of the Civil Service Commission. U. S. Civil Justice Fred M. Vrooman officiates in the ceremony. Eynsbuck is on a 15-month leave from ATA to handle his new duties in his former post as ATA General Counsel. (Inset: Eynsbuck).

INDUSTRY OBSERVER

First Sikorsky H-39 two-place helicopter to be sent to Korea will be watched closely by all those concerned in cockpit evolution, since the big craft has been ordered in quantity by Air Force and Navy and will be bought by Army as soon as the weight limitation on aircraft the Army can buy is waived out. At least one H-39 is due for arrival in Korea very soon and may already be there.

Official report on the crash of the Bell Army H-34D helicopter in Korea after which Maj. Gen. Bryant E. Moore died, states that the craft struck a cable while down at very low altitude, and turned over. Fuel tanks and tail rotors were badly damaged, but the cabin was not. Medical report indicated the general's death was due to heart attack possibly induced by shock, but not from injuries suffered in the crash. The report closed the matter of mechanical malfunctioning.

Pitt & Whitney's new J-57 turbojet is taking up the challenge of the Allison J35-A-23 engine for the class of most powerful American engine (see page 25) with a statement that the J-57 is "superior in power and fuel economy to any other engine known to be in a comparatively forward state of development" (flight test stage). Both engines are reported to have dry thrust ratings around 10,000 lb.

Range of U. S. jet locations is gradually lengthening, as indicated by the newly disclosed flight of a North American RB-49C swept bomber from Fairchild-Republic AFB, Calif., to Honolulu, 15,500 mi. The flight was made last Sept. 22, but was only recently reported.

U. S. Dept. of Agriculture scientists have developed a new synthetic rubber, Lunaprene HN, useful for oil seals, fuel tank lining, gaskets, and similar uses where unusual range of high and low temperatures are experienced. It keeps its desirable properties at temperatures from 300 deg. F. to minus 50 deg. F. and has good resistance to water, oil, and aging. Principal components are butyl acrylate and acrylonitrile.

U. S. Air Force and Navy are following up Belluk experiments on remote pilot popovers for shorter landings for fighters. Belluk tests were made with Republic U. S. tests probably will be made with such planes as Navy Convair F4U, Vought F4U, and Air Force North American F8H. An alternative, also being considered for short landings, is the heavier rubber mat technique which the British also have developed. That has been used recently for carrier landings with Sea Vampires, but might be adapted for landing fields. In this procedure, a plane enters landing gear drops a landing hook and flaps down to a cushion stop on the rubber mat (Aviation Week, June 20, 1949).

The Burnell lifting bridge cargo plane model CAMEL, originally built for TACA by Canadian Car and Foundry Co., Ltd. is being demonstrated by Air Force and Army officials around Washington and Ft. Monmouth as an all-purpose cargo carrier. It is equipped with a payload of 5000 lb. for 1000-mi. range. Demonstration pilot is the veteran transcon flier Clyde Pangborn.

Principal U. S. aircraft and engine manufacturers are being queried by USAF as to their spare requirements for flight test work at Edwards AFB, Mo., Calif., in the expanded flight program which is planned there. Indications are that virtually all USAF flight testing will be concentrated there as soon as the basic facilities are expanded to meet the additional requirements.

Typical of some wingless Air Force security restrictions is one which allows general manager E. H. McGill declared "has been put on his company, subjecting a contract of \$200,000 threat to the limit for disclosure of specific engine thrust ratings. Meanwhile competitor companies have been permitted to release much higher thrust ratings for their products. (Pitt & Whitney F-5 is rated at 6250-lb. thrust, and Curtiss-Wright Supracat J-45 is rated at 7100-lb. thrust.)

Washington Roundup

When Will We Be Ready?

The recent U. N. advances in Korea have taken the status out of defense mobilization in Washington. After the big Communist offensive of last November, the ground clause here was for speed in an all-out build-up. Now, the Capital is stuck with delaying debate over [10] aspects of the mobilization program.

There's a fundamental clash between Charles E. Wilson's Office of Defense Mobilization and the Joint Chiefs of Staff. It's this:

• Wilson wants the military build-up spread over three years. U. S. would be ready for attack by mid 1944. The plan reportedly was "sold" to Wilson by top Administration publicists. At one time, it places that spreading the military drive on statements, third, and other bases in their supply after a few years would mean less hardship for contractors, farmers, businessmen—and less nervous for politicians.

• Joint Chiefs of Staff are content on spreading the buildup into a year-or-half, reaching effective fighting strength by mid or late 1952. This "target date" is based on intelligence reports, indicating what they might be expected.

• Defense: The Wilson plan will be out. Secretary of Defense George Marshall reportedly is ready to give up his position, and that would crash it.

It would take another Communist onslaught in Korea, or elsewhere, for Washington, once again, to give top priority to the position of the JCS, observers say.

Air Power's Hopspr

Rep. Gen. Benner Fellers (ret.) a West Pointer and career Army officer, is seen by many as the godfather back of the GOP's drive to make political hay over the Administration's intent to "boost the taxpayer's money" as a big build-up of ground forces.

Top USAF officers don't go along with the Fellers thesis—that the U. S. ought to pull in its horns, all but abolish the Army, and rely almost solely for defense on long-range strategic bombing. Top USAF officers, as well as top Navy, are often said to hold Fellers as a base for aggression and escalation based around the world—supported by Army contractors. They up this in politics, as well as in the record.

A friend of Fellers, who served with him in the last war, said to Aviation Week:

"He scored an Army bashing while serving under MacArthur in the Pacific during the war. He was disappointed at his slow advance in the service. A member of the West Point class of '31, he watched officers of first class promoted over him. He reluctantly returned to the Republic. Notorious Committee. His plan for all-out emphasis on strategic air, with secondary emphasis on Navy power, and reducing the ground forces to a small mobile force, saving the taxpayers' billions of dollars annually, clicked there."

Target: Vondenberg

Some Republican senators in the "isolationist" camp are applying other undervalued and unsound criteria to USAF's Chief of Staff, Gen. Ben Vondenberg.

They want the USAF general to come out against the Administration's plan for the defense of Western Europe—which includes a small contingent of U. S. land forces there. They want him to advocate complete defense reliance on strategic aviation. His daily's Sen. Vandenberg told the Senate Foreign Relations Committee, strategic air as well as aerial U. S. defense would be the better if Europe were laid on one side.

But he didn't say his chance to play as power in his public appearance. He thought it ought to be built up later and higher. But this didn't satisfy the Republicans.

Commented one Republican leader: "If Wiley's Mitchell crew had that power, couldn't a small contingent to Europe, I can see the case, over in his zone. What's the matter with the Air Force? Why don't they have any Mitchell approach?"

Air Support to Europe

Prospect is that USAF will supply substantially more support to Western Europe than the Army with its air divisions. The present view is one tactical air group to each Army division.

USAF's Ed. G. Latta Nantua is now supervising the situation in Europe. His preliminary reports say that substantially more than an air group will be needed to repair the lack of air power on the Continent. European nations that can equip ground divisions will require U. S. air groups for their tactical support.

Investigations

• **Isolationist and now.** There's going to be a big showdown behind closed doors of Senate Appropriations Committee soon on mail pay, to international centers.

The 1951 fiscal year Post Office Department appropriation bill, passed by the House last week, is now before the group. The new chairman of the subcommittee on Post Office, Sen. Hiram Kilgore, is convinced internal removal salaries—Pan American World Airways in particular—are "nothing off with the Federal Treasury." He is going to start to get the job.

Worry of some Senate people that in doing this, he may touch out into another for focus Post Office Department mail payments. He may lead into the payments to Pan American for building "military" bases in South America during the last war. The clock of money has been used in the past.

• **CAR thinks and their influence.** Sen. William Fulbright thinks there ought to be an investigation of how friends and political contributors influence CAR and other quasi-political agencies in Washington.

The objective of the investigation is legislation setting up a code of ethics for members of the agency.

But Fulbright, whose investigation job as Reconstruction Finance Corp. may have set him in the Democratic doghouse politically, doesn't want to do it. He has recommended that "an outside commission of private citizens" be appointed for the complicated task.

The Republicans are determined that there's going to be an investigation. They'll cheer for it. As the truth dawns that several top Republican Senators might figure prominently in it, however, observers think that clearing will probably dwindle. —Katherine Johnson

AVIATION WEEK

Funds Cut Threatens All-Weather Program

Military and CAA asking that ANDB's 1952 budget be slashed by \$5.3 million.

Air Force, Navy, CAA and Army that week will send the House Appropriations Committee a revised and sharply cut fiscal year 1952 budget for the Air Navigation Development Board. Because of the cut, most development work on the all-weather civilian system of navigation, landing and traffic control is being held up by these agencies to assure short-term and development effort on short-term military electronic projects.

The slash has dropped the ANDB total of the Commerce Department to \$12.1 million from its original figure, \$8.5 million, a reduction of \$5.3 million.

This represents a cut of approximately two-thirds of the research and development program, and of only slightly over one-tenth of the total Air Force, Navy, Army and CAA efforts.

Observers close to the Board's activities are fearful that the cutback may set a precedent for future defense actions that are destroying the effectiveness of the Board as an overall military-civilian system of navigation and landing aids. ANDB has at times killed serious research projects in order to obtain the funds they thought essential.

• **Temporary Move Soon—However.** A high CAA source states that there is no intent to make the maintenance of ANDB's program permanent, and that its success as a coordinated unit stands in the air navigation and traffic control field is fully recognized by the federal agencies. This is the trouble in the future.

Under the worst interpretation, this could mean that Air Force, Navy, Army and CAA will take over independently as their own navigation and control research projects, driving off in four separate directions with the central direction which ANDB was established to prevent.

Just what happens to the ANDB technical staff is the subject that is going on in a good number. All of the staff came to ANDB from industry. Most of them are looking back toward industry again.

Meanwhile the ANDB, which by consent of the four government agencies, has held a unified control of research

and development for air navigation and control for the last two years, could become put in a position to be taken over by Congress or the Dept. of the Interior without the independence of action which has made it effective.

It is understood that part of the slash came because the ANDB project list duplicated, at least in part, some of the classified military projects which were being given high priority, but had only specialized applications. Research on these projects, however, it is understood, would have definite civilian application in some of the ANDB projects.

• **Not Abandoned—The high CAA source states that the ANDB program was far from being abandoned, and that it was rather in emergency delay, and that it was not in any way in need for available research facilities.**

On the other hand, it has been pointed out that the entire ANDB program originally planned for fiscal 1952 would amount to only \$5.5 million or less than one percent of 1951 military aviation electronics research costs of over \$2 billion. It is further observed that the whole ANDB program for all-weather flying has definite military application.

This statistic it had been expected that military agencies would call for more emphasis on research and development projects with immediate application to military needs at the expense of the civil military program.

But ANDB staff members are reportedly worried over the fact that they were not consulted in making the cut. And because they had no say, the wisdom of decisions will naturally be little or no conformity at an overall program, some observers feel.

• **Navy Proposals—CAA Administrator Donald Nerry made the actual proposals for the two-by-two slash which is now ready to go into effect at a recent meeting of top officials representative of the military services and CAA. The Navy proposals were reported as "right down the line" with the desires of Air Force and Navy, as to which projects were to be long-term, or were not essentially military. Yet analysis of the total list of projects (last year page) indicates inclusions where short-term projects were dropped and long-term projects**

were kept, and other inclusions where Air Force and Navy projects were canceled. Yet strongly expressed, not one of the CAA sponsored research projects lost a drop in the cutback.

A possibility remains for salvaging the overall ANDB program of a top Department of Defense step up, or at least a Congressional move to the ANDB concept because of its unique features which limit duplication of research and development among the agencies. Deputy Secretary of Defense William Lovett, who has been advised of the blowup, is now reportedly examining the situation.

In the longer years, when Air Force and Navy were short of research funds, they welcomed the idea of joint participation with civilian agencies in the long-term technical program for all-weather flight, stressed by a single congressional appropriation.

• **Through Budget Bureau—The appropriation goes through the Bureau of the Budget, and then to Congress as a part of the Commerce Department appropriation, since Commerce Department acts as the housekeeper for ANDB.**

But this time, in an annual process, high-level representatives of the four agencies met in February and prepared the list of cuts in projects, which was later presented to ANDB as an accomplished fact, without recourse by the working level members on the staff. But at the last, the staff of ANDB was given a directive to submit the completed program in its budget request for 1952 fiscal year.

Setting it as the top level deciding authority headed Administrator Nerry were Harold C. Smith, Assistant Secretary of Air Force, John F. Flanagan, Assistant Secretary of Navy for Air, and A. S. Alexander, Undersecretary of Commerce.

Members of the ANDB are: Col. S. A. Massey, USAF; Col. W. B. Lane, Army; Capt. C. G. Miller, Navy, and J. E. Sweeney, CAA.

Technical staff of ANDB is headed by Dr. Douglas H. Brown, director of development. Chief RCA engineer brought in to run the program under a special defense Department Research and Development Board classification. Key members of his engineering staff include Norman L. Brown, Wesley L. Laverne, R. Polgott, Maxwell K. Goldstein and Henry R. Snel, all of whom came to the board from private industry.

Proposed Changes in ANDB Program

ANDB ACFT	PHASE/TYPE	CONTRACTOR	STATUS	FY 1960	FY 1961	REMARKS	STATUS	REMARKS
11	Study of engine development	General	Completed			1.5	Completed	Completed
12	Study of engine development	General	Completed			1.5	Completed	Completed
13	Study of engine development	General	Completed			1.5	Completed	Completed
14	Study of engine development	General	Completed			1.5	Completed	Completed
15	Study of engine development	General	Completed			1.5	Completed	Completed
16	Study of engine development	General	Completed			1.5	Completed	Completed
17	Study of engine development	General	Completed			1.5	Completed	Completed
18	Study of engine development	General	Completed			1.5	Completed	Completed
19	Study of engine development	General	Completed			1.5	Completed	Completed
20	Study of engine development	General	Completed			1.5	Completed	Completed
21	Study of engine development	General	Completed			1.5	Completed	Completed
22	Study of engine development	General	Completed			1.5	Completed	Completed
23	Study of engine development	General	Completed			1.5	Completed	Completed
24	Study of engine development	General	Completed			1.5	Completed	Completed
25	Study of engine development	General	Completed			1.5	Completed	Completed
26	Study of engine development	General	Completed			1.5	Completed	Completed
27	Study of engine development	General	Completed			1.5	Completed	Completed
28	Study of engine development	General	Completed			1.5	Completed	Completed
29	Study of engine development	General	Completed			1.5	Completed	Completed
30	Study of engine development	General	Completed			1.5	Completed	Completed
31	Study of engine development	General	Completed			1.5	Completed	Completed
32	Study of engine development	General	Completed			1.5	Completed	Completed
33	Study of engine development	General	Completed			1.5	Completed	Completed
34	Study of engine development	General	Completed			1.5	Completed	Completed
35	Study of engine development	General	Completed			1.5	Completed	Completed
36	Study of engine development	General	Completed			1.5	Completed	Completed
37	Study of engine development	General	Completed			1.5	Completed	Completed
38	Study of engine development	General	Completed			1.5	Completed	Completed
39	Study of engine development	General	Completed			1.5	Completed	Completed
40	Study of engine development	General	Completed			1.5	Completed	Completed
41	Study of engine development	General	Completed			1.5	Completed	Completed
42	Study of engine development	General	Completed			1.5	Completed	Completed
43	Study of engine development	General	Completed			1.5	Completed	Completed
44	Study of engine development	General	Completed			1.5	Completed	Completed
45	Study of engine development	General	Completed			1.5	Completed	Completed
46	Study of engine development	General	Completed			1.5	Completed	Completed
47	Study of engine development	General	Completed			1.5	Completed	Completed
48	Study of engine development	General	Completed			1.5	Completed	Completed
49	Study of engine development	General	Completed			1.5	Completed	Completed
50	Study of engine development	General	Completed			1.5	Completed	Completed

Gaps in Aviation Safety Research . . .

Survey by the Aviation Safety Center at Cornell University indicates that despite more than 500 research projects in aviation safety now being carried on by various research agencies, there are gaps to be filled by additional work in the following areas:

- **SERVICE TESTING TO IMPROVE THE RELIABILITY** of aircraft structures and equipment, particularly electrical and electronic accessories, at the level of a true or false breakdown criterion, involving all aircraft manufacturers.
- **INSTRUMENTED CRASH TESTS IN MILITARY**, transport and personal aircraft to determine critical and safe loads and structural deformations. Tests should simulate actual conditions with shock, density, curves, instrumented, and equipment, to determine progressive deterioration of structure, and establish load criteria for design of seats, belts, shoulder harnesses, and strengthening of cockpit or cabin structure.
- **ADDITIONAL RESEARCH ON CONVERTIBLE** aircraft combining vertical takeoff with horizontal flight and its possibilities for present aircraft.
- **PREPARATION OF A HANDBOOK ON AIR-WEATHER HYDRAULICS** and procedures including a section on safety measures necessary with installation of crash equipment, similar to AIA handbooks on air

craft electrical installations and aircraft fire protection.

- **IMPROVEMENT OF METHODS NOW BEING** used for developing weather reports in off-aisle points and the nation's small airports.
- **IMPROVED SHORT RANGE FORECASTING** and more complete visibility information, to discover hazards existing in the airport area that are not now revealed by instruments in the tower.
- **ALL-WEATHER LANDING AIDS FOR PERSONAL** aircraft, with study of automatic control from ground, utilizing military automatic guidance equipment developed for missiles.
- **COORDINATING STUDIES** recently completed on military pilot training methods, using flight simulators and training aids, and aerospace training equipment, to improve both military and commercial pilot training.
- **ACCELERATION OF RESEARCH TO DETERMINE** ability of pilot and crew to function in emergency under varying degree of mental stress or fatigue.
- **GREATER USE OF ADVANCED STATISTICAL** analysis methods and computers to determine accident factors and measure trends and cycles in accident analysis of records and operational data.

Center Aims to Make Air Travel Safest

Guggenheim group calls together civil and military aviation officials to coordinate safety research.

By Alexander McFarley

How can aviation be made the safest form of transportation? That is the big question which the new Guggenheim Aviation Safety Center at Cornell University has taken as its objective.

Last week the center called together in Washington top U. S. civil and military aviation officials authorized in safety to start a coordination of research programs—a quest for gaps in present aviation safety research—to make possible future higher marks in flight safety.

That is not saying that today's aviation safety record isn't excellent overall. But it can and will be improved much further, the Aviation Safety Center insists.

• **Study Improvement**—Take a look at the projects in sight in improving air transport safety as current ones using the common yardstick of the number of injuries per million passenger miles for the domestic scheduled airlines you find in these periods since 1950: the figure has shown, progressively, from 1.5, to 6.1, to 2.4 to 1.6, to 1.3 in 1950.

Then if you compare over-1000 flying you find that as good as better than that of surface ocean vessels, by the time you add a with a perfect score in the year 1949.

To go further to make a domestic scheduled airline in 1950 was twice as safe as traveling by private auto, but only one sixth as safe in terms of bus travel.

Unfortunately, records for the non-scheduled and irregular air services are not so good, and personal flying safety records are definitely open for major improvement. The Guggenheim center's frank and factual analysis finds a record of 39 to 40 fatalities per million enroute passengers for personal flying compared with the fairly good of the home and higher rate of 1950.

• **Safety Projects**—The Washington conference at National Aviation Committee for Aeronautics investigators disclosed that more than 600 non-classified research projects were in making flying safer, are also under way in this country, in addition to other projects which have been classified secret.

Harry P. Guggenheim, president of

the Daniel and Florence Guggenheim Foundation, established the safety center last September, "to foster improvement of aviation safety by research and education." Key operational heads of the center are Dr. T. P. Wright, former CAA administrator, and Dr. J. H. Doolittle, former chairman of the center, and Jerome Lederer, former aviation safety engineer and director of the center.

A greater emphasis on safety in aircraft design will be sought by the center through influencing the aeronautical engineering curricula in U. S. universities and technical schools. The several Guggenheim-endowed schools, which are among the preeminent engineering schools of the country are expected to take the lead in this new engineering educational trend, with an ultimate far-reaching effect on tomorrow's aircraft design.

The center will prepare national research projects, and will permit for the students of a new course in human engineering for all aeronautical student engineers. Additional safety data for information in the aviation safety data will be prepared to show good safety design projects.

Director Lederer has already made about 15 trips on the program in this country and in Canada, and is sched-

ried to talk in England, before the Royal Aeronautical Society last September. An aim of the Gougher team during it is to make the work of the society international in scope, recognizing aviation safety wherever planes fly. Also a primary objective, Ledez points out, is to make the whole program a co-operation with aircraft manufacturers, insurers and operating companies, schools and research centers.

First period in "promoting awareness of aviation safety by information exchange" was a comprehensive survey of existing aviation safety research projects, aimed at determining where the gaps were that needed further research attention.

Initial report, dated Jan. 1, was completed after study of current projects at Air Force, Navy, Army, Coast Guard, CAA, CAB, NACA, Bureau of Standards, Weather Bureau, National Research Council, ICADO, General Industries, Army and Air Transport Association, and organizations of the transportation's Research and Development Board.

Other groups used as sources for projects included aviation insurance companies and suppliers, scheduled airlines, schools, industrial laboratories, and privately financed research units.

Scope of the Gaps. Analysis of some of the gaps in existing research called for projects such as: crash research to full-scale cabin construction experiments with driver errors and postcrash, run test criteria for improving reliability of aircraft accessories and equipment and as in-flight guidance for personnel practices patterned on military controls for guided missiles.

Taking a look at some of the activities research projects now underway you find such things as: Texas A & M's research project to develop information for cockpit layout based on actual use of the seat and pedals; the FAA's, NACA's compilation of data from overseas operations on steeped, altitude and control authorization in relation to experiences with panic GAA studies on emergency procedures; a review of possible decompression of pressurized cabin safety; Cornell University's on toxic effects of carbon monoxide; and the Boeing Company's "free man" project studying the maximum patterns of human bodies during crash decelerations.

This goes on idea of the magnitude of the task that has been given the new organization at the outset.

All in all, the report of the first seven months shows that 1950 was one of the busiest years in the history of the research projects, since the projects are catalogued under four titles on one general subject, if they are pertinent to more than one. Standardized research information centers, and the Air Technical Index, directed by the Navy's CAA, and Institute of the Aeronautical Sciences, is employed for the listing.

Our Expanding Industry . . .

Kaiser-Tutor Corp. is doubling the manufacturing space of its Oakland (Calif.) Aircraft Division with a new expansion plant containing about 750,000 sq. ft. When the new facility is in operation late this summer, about 500 will be employed on manufacture of Lockheed's F-104 Navy patrol bomber.

Block division of General Motors is starting construction of a new building to be used in manufacturing the 1-675 Supra jet engine.

Hiller Helicopters has rented additional manufacturing space at Redwood, Calif., to bring its space from 70,000 to more than 60,000 sq. ft. Before the year is out, the company will increase the area above 100,000 sq. ft. Growth is made necessary by new orders from the Air Force for the H-21A conversion copies, and from the Navy for the H-21B training machine which began Hiller's backlog to 575 orders.

When Mr. Co's aircraft division has signed a new lease with Lockheed, that one for components of the PTV-6. Lockheed also has increased its contract with Hiller for sub-contractors of the T-33 jet trainer and the T-33 jet trainer and the T-33 jet trainer and the T-33 jet trainer.

When it opens a new plant at Downers, Calif.

Additional aviation safety research will be conducted by the center, acting as a focal point for the exchange of aviation safety information, and it will also encourage additional research projects to solve safety problems that are not now being attacked by researchers.

Headquarters for the Gougher Aviation Safety Center has been established at 2 E. 44th Street, New York, in space made available to Cornell University by the Institute of the Aeronautical Sciences.

Following are the foundation committee, and the executive committee for the center:

Foundation committee: Harry F. Gougher, Chairman; Vice Admiral John H. Cawley, Deputy-Chief of Naval Operations (Nav), General J. Lawton Collins, Chief of Staff U. S. Army, Dr. Jerome C. Hunsaker, Chairman, National Advisory Committee for Aeronautics, Director of the Navy's CAA, Vice Admiral Melvin O'Neil, Commander, U. S. Coast

Guard, Delos W. Rountree, Chairman, CAB, General Hoyt S. Vandenberg, Chief of Staff, U. S. Air Force, Dr. T. P. Wright, Acting President, General University, Dr. C. Edward Priddy, Chairman, Jerome Ledez, Safety Center Director.

Executive committee: Dr. Wright, Chairman; Jerome Ledez, Major General Victor E. Benish, Deputy Inspector for Technical Inspection and Flight Safety Research, National AFB, John Chambers, Director of Safety Regulations, CAA, J. W. Crowley, Assistant Director of Research, NACA, Dr. C. C. Pappas, Director, Cornell Aeronautical Laboratory; Major General James G. Dwyer, United States Army, Ernest Henley, CAA Director of Aviation Safety.

S. Paul Johnston, Director, Institute of the Aeronautical Sciences, Dr. Richard P. Frazar, Coordinator of Research, Cornell University, Capt. W. R. Schell, Executive Assistant, Research and Research, U. S. Coast Guard, Dr. W. G. Saffell, Professor of Public Health and Preventive Medicine, Cornell Medical College, Commander William G. Von Krogh, Head of the Flight Safety Branch DCA-10, Navy Department.

Electronic Production Board Established

An Electronics Production Board which will be responsible for overall coordination of work in that field under the mobilization program has been established. The Production Administrator W. H. Harrison.

The new board is charged with determining the field requirements—orders, civilian and foreign—for electronic products and to recommend methods for their production.

The EPB, in addition, will establish policies and procedures for securing required production, including production facility expansion, concentration and standardization of products.

Administrator Harrison, in announcing the new board's establishment, said, however, that National Production Authority will still remain the principal point of contact for the electronics industry on questions relating to contracts, production, materials and supply. Similarly, he pointed out that procuring services, including the aerial forces, and the Atomic Energy Commission will remain the points of contact for their contractors.

Harrison said that the use of electronic devices has grown to such large proportions in equipment for defense, machines of industry and for communications that the Department of Defense is developing and producing electronics on a scale could hamper mobilization.



WORLD'S LARGEST PLANE, Hughes flying boat, as it was being prepared for flight a few years ago, a mere child in its preparation.

Hughes Boat Being Prepared for New Flight

By Don S. Lee

The world's largest airplane, Howard Hughes' eight-engine flying boat, which hasn't flown for a year and a half, is now being prepared for new flight tests scheduled to start in May.

West Coast sources say the big plane has been hauled on Trawlers Island, Long Beach Harbor, Calif., behind locked doors under a top-secret status imposed by Hughes for approximately a year.

Atom-Powered Prototype?—There is some speculation that the big wooden plane might be advanced at a prototype for an atom-powered experimental flying boat. Top civil aviation officials protest that the first atom-powered aircraft will be about the size of the Hughes craft, and that a flying boat must make a commercial vehicle to carry an atomic engine. A long time, these authorities point out, could and take off in area where large populations would not be endangered.

The new prototype which was designated the H-4460 had actually nicknamed the "Hercules" by the U. S. government was \$18 million in addition to approximately \$17 million at Hughes two years ago.

Howard Hughes is currently spending approximately \$160,000 each month on the flying boat. Since its first flight, Nov. 1, 1947, Hughes has spent about \$10 million on the construction of a new electrical engine control system, various modifications and special tests.

During its 10-month fly-back modification period, its original auxiliary engine has been removed and a new

articulated engine has been substituted in place of the old. The new engine, he said, is the first of its kind, and is a great principle. It is adaptable to any engine determined by the plane's chief engineer of design, eliminating the placing of tremendous pressure on parts of the hull and permitting water and water landing and taking.

Also the original atom-powered engine structure has been replaced by a more permanent metal structure.

Physical Construction—Built entirely of Duralumin, polished plating, the H-4460 is probably the outstanding example of wood construction, and very possibly the last example of wood plane that will be built. Despite much public controversy a company official declared, the flying boat was completed at a cost of \$10 million less than that of any other large experimental plane in recent years.

Constructed at Inglewood, Calif., according to World War II contract terms which specified non-strategic materials, plus made in the extreme bombing account guaranteed considerable production. Eventually these difficulties were removed by use of aluminum, tapping very high frequency electronic currents through the wood, and special glass fiber control system, however, that, if the H-4460 is ever duplicated, it would be of metal.

Specifications—The plane has a nose area of 538 ft. 6 in., total length of 256 ft. 6 in., height from bottom of hull to top of vertical fin 79 ft. 10 in. The plane has a gross weight of 330,000 lb. Performance specifications called for a top speed of 218 mph., cruising speed of 175 mph., and a cruising speed of 1950 mph., with a 65 ft. 10 in. landing gear. Used in a bombing operation plane the H-4460 could accommodate 1500 liter bombs and necessary complement of standard aircraft personnel.

Three Outlets Originally—The development of the world's largest airplane at the U. S. Maritime Commission as a means to eliminate the source of resistance against further shipping. The original Hughes contract called construction

The Hughes flying boat is powered by eight Pratt & Whitney Wasp engines developing 1000 hp. each. It was recently reported that new Pratt & Whitney 4460 engines were installed in the flying boat, replacing the old 4460 engines from 24,000 to 28,000 hp. A company spokesman said, however, that no engine changes have been made although Hughes would be interested in larger propellers when more powerful engines become available.

Current power plants are contained in conventional nacelles mounted on the leading edge of the wing.

Since last been seen, however, to leaving some powerful engines in engine rooms in the large wing with extension shafts to propellers. If the engine room plan was adopted in future development of the flying boat it would mean that only the propellers would be exposed. This would greatly cut down nacelle drag and at the same time would permit possible coupling of two engines for greater horsepower in thrusting.

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Three Outlets Originally—The development of the world's largest airplane at the U. S. Maritime Commission as a means to eliminate the source of resistance against further shipping. The original Hughes contract called construction

through Boeing's production plants. Reconstruction Finance Corp. (RFC) agreed to back the project to the extent of \$15 million.

Negotiation with Hughes Aircraft Co. and Henry Kaiser Shipyard Corp. was entered into by Maritime Commission and Defense Plant Corp., architect of whose work was entirely finished as far as actual development costs, in 1942. Rebuilding the B-47, it was estimated that the \$15 million represented the gross development costs for not only actual plane construction but for facilities built in that connection.

An Force and Navy, not entirely happy with the whole idea, began work, finally agreed that they would lead whatever technical assistance was necessary as requested in the project. In 1944, when the World War II buildup began in favor of the Allies and aircraft production was cut back, both agencies pulled out of the Hughes Kaiser venture. Maritime Commission then ordered the original three-phase production prototype contract revised. Development in other experimental aircraft stopped out of the picture.

Henry Kaiser, strong on immediate mass production in steel for the plane because he'd learned Howard Hughes and RFC with an \$15 million dollar headache. At that time some \$15 million had been obligated by RFC and the difference consumed.

Due Flight-On its first flight Nov. 7, 1947, the plane was airborne at an altitude of 58,000 ft. It carried 2000 gal. of gas in its 14,000-gal capacity tanks. During its first and only flight so far, the plane reached a speed of 94 mph before touchdown in the waters of San Pedro Bay where it was lost in Angeles.

Recent work entered by Hughes Aircraft Co. against RFC to recover approximately \$2.5 million upon its resumption of the B-47 program. Hughes actually seeks classification of early negotiation in the 1944 contract review.

RFC officials say that the Calver City plant and facilities originally built for the flying boat development cost up approximately \$1.5 million and that those funds were scheduled for inclusion under the total \$15 million set aside for HBC development. Hughes claims the entire \$15 million is for actual plane development.

The plant was declared surplus to the government through War Assets and sold to Hughes Aircraft following World War II. It is reported that company officials are seeking now to recover the original \$2.5 million plus an approximate \$300,000 under a price escalation clause.

Reconstruction Finance Corp. has

OK'd a \$2.5 million they seek a qualified definition of contracts and some definitive writing of late agreements for the surplus.

Because the plane is legal property of the RFC, following the 1944 seizure of the surplus, it is planned to be built, a letter of agreement between Hughes and RFC set out lease of the B-47 on a monthly rate, an hourly flight rate and an hourly engine running rate. There has been some disagreement about between Hughes and RFC in interpretation of those agreements on the lease.

Boeing's Backlog Reaches \$8 Billion

Boeing Aircraft Co. last week came up with the largest sales and backlog in 1950 yet reported by any of the aircraft manufacturers, backed up with a two-and-one-half times increase in profit and the largest since of profit to sales it has had since 1945.

Its sales of \$307,250,683 and backlog of \$1 billion as of Dec. 31 were both considerably higher than those of United Aircraft Corp. (Aviation Week Mar. 25, p. 17), which ranked at the top until Boeing's report was issued.

In 1949, Boeing's sales were \$237,012,524. For 1950, Boeing earned, after taxes, \$13,820,556, compared to \$4,411,343 in 1949. In its report, President William M. Allen declared that while Boeing is trying to give the government the greatest possible return on its defense dollar, the needs for expansion make it necessary that the aircraft industry be permitted to "earn and retain reasonable profits" after payment of equitable dividends for investment in the business.

Possibly because of that belief, possibly because of the unusual volume of business, Boeing in 1950 showed a noteworthy increase in the rate of profit to sales. In 1949, profit was about 3.5 percent of sales, versus about 1.7 percent in 1949. In the past ten years, only 1941 produced a better ratio, about 6.5 percent.

Last year, Boeing produced a record number of airplanes for a peacetime year, the report says. And its backlog should keep production high in several years, although Allen says that 1951 profits should not be as high as last year because of increased taxes and accelerated depreciation.

Boeing's order now include C-97s, B-47s, a small order on B-58s, B-29 and B-50 modifications and a production contract for the XB-42 biplane which is one of two prototype airplanes yet left over. Boeing Plant's money is being extended from 7500 to 10,000 to permit flight of the XB-52.

The company is expanding its operations in peacetime markets, the report says, but its net shifted production work on any jet transports because of the heavy investment required and the corresponding risk involved.

Stratojet Becomes Long-range Threat

Successful flight testing of the Boeing B-47B Stratojet bomber into a Boeing KC-97A tanker Stratojet bomber now makes the high-speed Stratojet a much more dangerous long range threat to enemy countries.

Successful flight testing of the Stratojet jet refueling had been accomplished near Wichita with repeated refueling contacts made between a Stratojet equipped with a refueling receptacle in its nose, and a KC-97A fitted with the Boeing long boom refueling system.

Range of the B-47B as refueled has not been disclosed, but it is known that it exceeds 2250 mi. since the company XB-47 prototype. Best test to date showed a transcontinental speed that Feb. 8, 1949 from Larson AFB, Washington to Andrews AFB Md. in 5 hr. 40 min. at an average speed of 507.8 mph.

First B-47A—First of the production B-47A Stratojets was rolled out of the Wichita factory a year ago, and since that time the plane has been going into increasingly rapid production as the largest bomber production plant in the Air Force program have been assigned for the Soviet bomber and the later four jet B-47Cs.

Second and current production model of the B-47, the B-47B differs from the A primarily in a number of internal changes, presently including landing gear. Third production version, forthcoming later this year, will be the four-engine B-47C.

Official plans developed with the Boeing refueling system are the Boeing B-38, and B-39, the North American B-45C and the Republic P-48C.

The B-47C is equipped with two large wing tanks with a capacity of 1200 gal. each, supplementing internal fuel tanks of 4300 gal. Official combat radius of the B-47C is 1000 mi. With equipment of in-flight refueling system, this range is considerably increased.

USAF still classifies as secret in-flight technique used on the B-47, but it is reported to be very similar to that of the B-45. The B-45 refueling equipment was based on the upper nose section of the plane. The technique is based on streamlining and is operated by an electrically operated hydraulic-controlled door.

Still longer range is expected for the B-47C.

How TIMKEN® bearings help 75 people to sit down easy

WHEN the giant, 75-passenger Stratojet comes down, the wheel and brake assemblies have to take a tremendous shock load. R. F. Goodrich engineers designed a new assembly for the plane that provides maximum strength to weight ratio for the wheels, they selected bearings they were sure would stand up under the shock—Timken® tapered roller bearings.

The Timken bearings provide the advantages, too. They permit rapid acceleration of the wheel on landing. They keep the wheels in alignment under the heavy loads, helping to avoid shimmy. They reduce wear, helping to cut maintenance cost. They give long life.

Hardy's who, Timken bearings have low contact between rollers and races that gives them tremendous load capacity. They're made of special analysis Timken steel, heat hardened for exceptional resistance to shock and wear. Their tapered construction enables them to carry loads, thrust and combat loads. They're made of steel and extremely smooth surface.

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Look practically anywhere for a bearing, make sure you get all the advantages that only Timken bearings give. And when buying tapered roller bearings, look for the trademark "Timken"—your guide to the best value. The Timken Roller Bearing Company, Canton, 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMKENCORP."

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The variable speed gear-driven superchargers that provide the added boost needed by many of today's larger aircraft, require steel that is tough enough to withstand the high heats, speeds and unit loads without giving way to fatigue and distortion; a steel that can be copper brazed and otherwise fabricated without a loss of strength; a steel that can be delivered with constant uniformity in a close tolerance range to guarantee the delicate balance so important to the part.

Parts pictured here are for hydraulic coupling—the heart of the supercharger—made of special Sharon chrome-moly alloy that exactly fits job requirements.

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PRODUCTION



DIMPLER UNIT (Back box) attaches to standard spacer, left, also has special tool.



Hot Dimpling Widens Metal Use

Improvements in methods of prepping flash riveting encourages new applications of high-strength alloys.

Hot dimpling of metals is proving wide acceptance in the aircraft industry. It overcomes the problem of brittleness of some metals under cold dimpling, and it is faster and more accurate than conventional dimpling. Perhaps the most significant result following development of hot dimpling equipment is it has encouraged broader use of aluminum alloys with higher strength-to-weight ratios and even higher weight magnitudes than. It has accomplished this by eliminating production difficulties in preparing these metals for flash riveting.

Practical hot dimpling equipment has been on the market for some time—equipment that can be used with steel and dimpling spacing machines, avoiding the need for heating over an additional machinery. Hot dimpling also truly lately developed also are quite adaptable to portable tools.

•**Squeeze-and-Dimple**—A good example of such equipment, which has proven popular with a number of aircraft manufacturers and airlines, is the "Thermastatic Control" Unit, designed for attachment to standard spacing machines (photo at left above), and developed by Aircraft Tools, Inc., Los Angeles.

This hot dimpling control operates in conjunction with special dies made

by the company. With it, a single spacing machine can hot dimple 7051 aluminum alloy and magnesium sheet, and cold dimple 2451 and aluminum. The company believes aluminum alloys, when they arrive on production lines in quantity, also can be hot dimpled with existing Thermastatic control units. Further development of the unit is being carried out, however.

Present users of the equipment are the Air Force, Navy, Consolidated Vultee Aircraft Corp., Douglas Aircraft Co., Glenn L. Martin Co., Northrop Aircraft, Inc., Texas Engineering & Mfg. Co., Pan American World Airways, Capital Airlines and others, according to Harold W. Delfert, vice president of Aircraft Tools.

•**Portable Unit**—A "Thermal Back" control (photo at right above) with special dies for use with portable spacing also is being produced by the firm. These tools are designed to dimple dies while it is on the aircraft.

The Thermastatic control unit has a background of sound experimentation. It employs conductive heating of the metal by heated dimpling dies. The heating element is placed in the dimpling tool and locks up the die. Tests and service experience have convinced the company this is the most reliable, straightforward method previously known

of successfully hot dimpling metals. •**Background**—Why is hot dimpling necessary? Because, explains Delfert, such high strength alloys as 7051 do not have sufficient ductility to cold dimple satisfactorily. They crack at the dimple too early. Still, it is highly desirable to use these high strength metals in applications where flash riveting is required, such as in aircraft skin. They could be continuously, to accommodate flash ribs, but that is a slower, more difficult and expensive process. And it doesn't produce as uniform results in dimpling, particularly if carried out by relatively unskilled personnel.

In cold dimpling, local elongation of the metal at time of fracture was 25-55 percent for 7051, while local elongation for 2451 could be stretched to 40-50 percent before fracture. Thus, in the same 2451 can be cold dimpled and 7051 cannot be. In fact, 2451 is one material, says Delfert, that definitely should not be hot dimpled because it is subject to softening and subsequent distortion.

It was discovered that with 7051, hot dimples were up to 15 percent stronger than cold dimples to the same composition. By dimpling 7051 at elevated temperatures, work hardening or embrittlement is minimized so the metal retains its strength and ductility.

When advantages of hot dimpling became apparent, Aircraft Tools set out to design a compact unit that would remove "dimensional" against flash riveting 7051 and magnesium and prevent them, too, to be placed in existing machines in the factory.

•**Heating Tests**—The question arose: What is the best method of heating the material?

To find the answer, the company's engineers conducted a series of tests on various methods of heating.

•**High frequency induction heating** of the dies was a promising laboratory test, but was not developed because of difficulties in insulating heat at desired areas. Also, there was evidence of damage to the metal material, probably because of extreme thermal gradients.

•**Resistance heating** appeared a rapid method and equipment was inexpensive. However, dimpling operations are expensive, the tool uses little dimensional control because of arcing and has an uncertainty of temperature was always present.

•**Preheating sheet metal** by an advance hot shoe was attempted, but high thermal conductivity of sheet rapidly dissipated heat before dimpling started.

•**Hot air blasts** and a number of other methods were proposed but did not receive serious attention.

•**Conduction heating** by heated dies, plug tools, heated up against all other methods tested, appeared to be the most efficient.

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IN STAINLESS ONLY -
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This kit is available in quantities of 100 (minimum) for resale. Write for the information.

American Chemical Paint Co.
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NEW YORK, N.Y.

► **Conduction Problem**—After deciding conduction better through heated dies was best, Aircraft Tools attempted to quickly cutting tools by using cones too or clamping heating elements. With this arrangement, control of heater temperature was satisfactory with the lighter gauge metals, where the rate of dissipation of heat was not too great. But, in changing heavier gauge, heat was pulled out of the tool and dissipated too rapidly.

The heat could not be poured into the clamping tool rapidly enough to maintain temperature. This caused the metal to crack, unless the rate of die temperature was reduced.

The solution was found in placing the heating element within the tool so it backs up the dielectric die. With this arrangement, a cold tool will heat up to operating temperature within one to two min., instead of 20 to 30 min. required by the clamping type of heater, says DeLett.

In order to determine sheet temperature accurately as possible, the thermocouple, rather than being placed in the heater, is located between the die and the tool and holder, rather than in the heater. This way the temperature reading is actually that of the tool.

► **Die Design**—Simultaneous development of the electronic part of the equipment, Aircraft Tools carried out development of suitable dies for the equipment.

In designing these dies, Aircraft Tools used several forming methods to determine the optimum die configuration and how severely dielectric should be formed. Three methods gave best results.

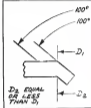
► **Natural forming** was based on a maximum movement of material, with no thinning from the circumferential and radial stress. According to DeLett, advantages of this method were: minimum pressure required, good structure with no internal signs of high stress. Disadvantages: Poor definition where and over a wide range of sizes, poor nesting in multiple stacked sheets, of 105 deg. counterbore are used, thickening of both 100- and 105-deg. counterbore in repeated process (small dies) tends to avoid oversizing and cracking in severe dielectric is necessary.

► **Over forming** has these advantages: sharp definition, permits multiple stacking, permits 100-deg. counterbore, reduces tendency to circumferential cracks. But its disadvantages are: requires greater tonnage, produces internal stress deformation in heavier gauges.

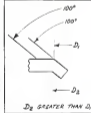
► **Optimum forming** heavily was achieved by measuring the length of dielectric to a critical relationship. Its advantages: sheet deformation is negligible, good definition is retained through out the full range of gauges, multiple stacking and 100-deg. counterbore pre-



THREE METHODS Natural forming—



over forming, and



optimum forming gives best results

duce the best possible nesting with no loose dielectric, provides the best balance of high strength, definition (resistance to permit methods), reliability for all size metals. It allows drawing, 1787, magnesium and titanium, cold drawing of 7481 and stainless steel.

Aircraft Tools gave much of the credit for developing the dies to Doug Lee Aircraft Co., whose engineering staff co-operated with it in the work.

UP THERE WITH THE BIG NAMES... CHAPTER NUMBER 3

when it's a DC-6 on **Delta** airlines **... SKYDROL is flying high**

DC-6's on Delta Air Lines get up and go. They get away quickly—where the air is thin—as they ply the runways of the Southern United States.

Cabin superchargers on all of Delta's high-flying DC-6's are long-contracted to Skydrol, Monsanto's fire-resistant, type hydraulic fluid. Skydrol gives the ships extra safety and permits longer service between supercharger overhauls. Skydrol has been proved efficient wherever hydraulic fluid is used in airplanes.

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equipment are protected. And Skydrol's high lubricity cuts maintenance costs.

Investigate the possibility for extra safety and savings that Skydrol holds for you. For information send a copy of the booklet, "More Safety in the Air with Monsanto's Skydrol," write MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1300 S. Second St., St. Louis 8, Mo.

Monsanto Skydrol Offers These Advantages:

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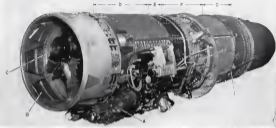
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MOST POWERFUL turbojet for which a production contract ever has been let is this one J35A-23, according to Allison. Details: (A) compressor, (B) inlet system, (C) starter, (D) 16-stage compressor section, (E) diffuser, (F) combustion section, (G) 3-stage turbine housing, (H) hot-gas cooling discharge air, (I) main hot-gas cooling duct. Engine diameter is 17 in.—same as earlier J35s

J-35 Points Up New Thrust Achievements

Allison's new model going into production sets stage
for stiff competition in 10,000-lb. thrust class.

By Irving Stone

Indianapolis—Annonouncement indicates that three significant achievements in the field of jet propulsion have brought new distinction to Allison division of General Motors Corp.

In one, the new J-35A-23, is announced as the:

- Most powerful jet engine under contract for production.
- Most economical jet, likewise, in this class.

And Allison has just delivered its 10,000th jet engine to the military.

Neither Allison nor the military will give any specific thrust figure for the J-35 except the usual "over 12,000 lb." value. But some idea of the engine's power potential can be deduced.

Allison does say it has been accepted for use in the prototype of Boeing's YB-47C and will fly in its place later this year. Because of the engine's "substantially increased power" compared with those now in the jet B-47E, only four of the new engines will be required. The company says the four engines will deliver "a great deal more power than the B-47E's are."

► **Thrust Enhancer**—Rated power of each

of the B-47E's General Electric J-47 jets are given as 5,200 lb. plus. The "plus" is the uncertainty quantity, but reports have attributed about 5,600 lb. thrust to the B-47E engine. On this basis, the new model gives total thrust of 11,680 lb. Doubling this thrust figure between YB-47C's four new Allison jets each J-35A-23 would give a power value of 46,720 lb.

But that computation must be further extended in the light of Allison's claim that the four new engines in the YB-47C will deliver "a great deal more" power than the six in the present Stratofortress configuration.

This phrasing should not be lightly interpreted, for engineers don't usually ascribe an extra few hundred pounds of thrust out of a jet engine. That, coupled with the fact that accuracy regulations tend to restrain power claims, should indicate that the "great deal more" means just that—perhaps an additional 1,000 lb. of thrust, bringing the figure to about 5,700. Other estimates put this value at 14,800 lb. thrust (Aviation Week May 31).

- **Other Canadair**—In view of all the "link boxes" in the turbojet field, it must be stressed that Allison's an-

nonouncement that the J-35A-23 is the "most powerful turbojet engine for which a production contract ever has been let" should be considered strictly a company claim. Other engine builders probably would dispute this distinction as well as the claim that the new engine is the most economical yet required for production.

- **Westinghouse** is reported to have a production contract for its J-40 and J-46, in the high power bracket.

- **Modified Suprajet** (J-45) is to be built under production contract by Canadair, Wright and Buick, an licensee, also will have a thrust rating that will push for top honors.

- **Pratt & Whitney**, which is said to have a production contract for its J-57, is reported to have entered this engine in a stage of development that gives it a thrust potential comparable to any of the new engines. It's likely that this turbojet has already passed its 50-hr. test to clear it for flight and is on its way to establish an official rating after the J-57A test.

Though Allison says that the new J-35 has set jet fever, the company claims the engine has produced its rating on the test stand.

- **GE in Dash Horse**—In the final analysis, these engines are only transitory. In the development of new piston power values behind almost as fast as they are

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established. How true this can be will probably be emphasized when General Electric's J-33 makes its debut.

While the existence of this project has never been confirmed, there is ample reason to believe that this engine will have a better path than any of the lesser, current project engines (Aero, 1948 Wings Dec. 9, 1958).

► **Fuel Consumption**—Allison also says that the new J-33's fuel consumption is 20 percent less than that of early J-35's. It is reported the figure of 1.15 lb./hp./hr. about for earlier J-35's is accurate, then a 20 percent cut would reduce fuel consumption of the new J-33 to about .92.

This value would seem at variance with the company's claim that the new engine is the most economical yet released for production, because current reports indicate that its life better than 3,000 hr./hr. thrust has been achieved or at least one other production engine.

But even though it is not clear at the moment what engine is the leader in the jet race, Allison's new prospectus is an impressive achievement design-wise. Measuring 172 in. overall, its new power plant is packed into the same diameter of the earlier J-35's 37 in.

This is a significant factor, because the new engine will mount in almost any nacelle taking the earlier J-35's, as well as making it readily adaptable to a great variety of planes. The basic wing of the F-47 will not require re-design to accommodate it.

► **Compression**—The J-33 packs 16 stages of compression into a relatively small space. Some idea of the efficiency of the air handling unit may be gained from the observation that the ratio guide rings are only about 8 in. long. Allison claims that the compression ratio is higher than that of any engine they know of. This means that it should be better than 7:1—the figure reported for the Spitfire.

Already under study at Allison—and at other companies—is a "topping" arrangement for higher compressor efficiency. In this configuration, a low stage compressor provides a high stage unit connected to the first turbine wheel with the second turbine wheel connected to the low-stage compressor (through hollow shafting).

► **Combustion**—Turbo-Combustion chamber is designed a "circular" configuration—a single can outer shell housing 10 individual burner into which air flows from the outer rim.

Allison engineers have found that this arrangement gives a low pressure drop and high combustion efficiency, and indicates greater promise for future development. The outer shell also affords a more rigid assembly than does the can type combustor design.

Three turbine wheels have been used

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Tests Resumed on French Aspin I

(McGraw-Hill World News)

Paris—The Air Ministry has resumed tests of the prototype of the new French variable airflow jet engine Aspin I, made by the Turbomeca Co.

Aspin I is designed to operate efficiently from low speeds down to the landing speeds of light personal planes. Its designer M. Seydewitz, president of Turbomeca, claims that it will combine sharply the operational flexibility and economy of operation of high-speed military planes.

It also is expected to offer high efficiency yet power for transports and general planes.

► **Dual Airflow**—The secret of the engine is a variable dual airflow which permits routing only part of the air entering the intake through the dual-bush chamber and turbine. The rest of the air flows along a separate channel around the turbine, and merges with the turbine exhaust.

The amount of air going through the turbine can be regulated in a jet of adjustable vanes which split the air coming from the dual compressor into two streams.

This system already has been used with success in the centrifugal compressor which have been designed by Seydewitz.

The variable dual airflow system, in addition to making the Aspin efficient at low speeds, facilitates starting and makes it possible to accelerate almost continuously from idling speed to maximum thrust, which side loadings and takeoffs. French sources claim that the Aspin's rate of acceleration exceeds that of both single airflow jets and turbo-prop engines.

It is actually a compromise between the turbo-prop and the ordinary jet, eliminating important disadvantages of both.

Aspin is more powerful than the turbo-prop at high speeds; it delivers a much greater thrust than the straight jet at low speeds.

The relative weight of the Aspin isn't much greater than that of an ordinary jet engine. And it makes possible substantial weight saving through reducing the height of the aircraft landing gear.

Total weight of the experimental Aspin I prototype plus engine is 264 lb. Maximum thrust obtained after the latest improvements was 500 lb. Specific fuel consumption at 450 lb. thrust during tests was 63 lb./hr.

Tests Satisfactory—The Air Ministry recently completed a 1000-hr. endurance test of the Aspin. The engine was run between 15,500 rpm and 16,500

rpm for 150 hr. giving an average thrust of 450 lb. When it was restarted and found to be in perfect condition. The test was repeated and the engine delivered an average 400 lb. thrust for another 150 hr. at speeds between 15,500 rpm and 16,500 rpm. The Aspin still was in perfect operating condition at the conclusion of the tests according to official inspection. The only repair required during the tests was the replacement of a defective spring.

Tests now have been resumed following overhauling and improvement of the prototype. Turbomeca's engineers hope to be able to improve the performance of the Aspin simply and piecemeal to reduce the relative weight of the engine.

DH Prop Work Helped By Induction Heater

(McGraw-Hill World News)

London—Dr. Harold David, Propeller Ltd., Hatfield, Hertfordshire, has just installed a Melqui high-frequency induction heating generator—continues the liquid in Europe and possibly in the world—for use in rapid local heating and hardening of large steel propeller components (blades and hubs) which it is not feasible to handle by any other means.

This represents a new production process at Dr. David's, accomplished by a new type of blade made from a grid of steel that has not previously been used.

The generator—named the F250 model by Philips Electrical Ltd.—has a maximum output of 200 kw on alternating work and 150 kw on continuous service, at a nominal operating frequency of 27.5 kw.

It is fitted with automatic power-output level control, by means of a built-in variable coupling transformer, which compensates for changes in load when heating ferrous materials through the Curie point.

All working cycles of the unit are fully automatic. The generator can also be manually controlled.

It is designed for 108-140 v., three-phase, 50-cycle current, and requires a maximum power input of 180 kw. At 150 kw output, the power factor of the equipment is 9.9.

A wide choice of automatic operating time ranges can be effected by the circuit to the generator at two synchronous motor times.

The equipment is 7 ft. in height, 44 in. in width and 12 in. in depth, and weighs 3 tons. For ease of transport the heavy components are readily separable and the framework of the whole equipment divides into two sections.



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PIERCE

Design Detail: Russia's MiG 15



Engineering direction in this drawing by Tom Turner of the MiG-15 shows the structural possibilities of Russia's prime defensive fighter. Based on much layout, interpretation of photographic detail and intimate knowledge of aircraft structure, this Britain expert's drawing presents (visual structure of the MiG is detail which has not yet been captured.

Primary mission of the MiG is a defensive one—it is Russia's newest bomber interceptor action. This little Red craft is a squadron leader throughout the Soviet zone of Germany and in other satellite countries.

As it well known by now, the MiG is a supersonic aircraft powered by a Ramjet-built development of the Bodo Regent No. 10 turbojet. At the time these British engines were sold to the Russians, the state thrust rating was 3000 lb. It is certainly reasonable to assume that these have been engine improvements since then; coupled with the seven use of an after burner, must push the thrust of the combination toward the 8000-lb. mark. To this can be attributed the rapid getaway and climb characteristics which have been observed by UN planes who have fought the MiG.

Best estimates of sea level rate of climb credit the MiG with 8000 fpm at 30,000 ft., that figure is reduced only to 4000 fpm. Top speed at full throttle with afterburner is estimated at well over 700 mph.

Span is 32 ft. 6 in. and overall length is 32 ft. 9 in. Gross weight is reckoned at about 12,500 lb. Sweep angle of the wing is 38 deg., measured at the quarter chord line.

Design philosophy behind the MiG is, of course, not known. But it probably stems from German thoughts on defensive fighter developments. • Short fuselages, to keep inlet and tailpipe lengths to a minimum and reduce drag losses.

• Sweptback wings, a German aerodynamic finish.

• Large vertical tail, for control during takeoff and landing and accentuated by the short fuselage moment arm available.

• Mainstreamed horizontal tail, because the trend was to tailor aircraft, and conservative designers weren't quite ready to go all the way.

The MiG-15 is based on—yet copied from—three German ideas

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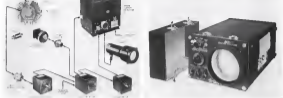
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From Airborne Analyzers Such as These . . .

SPERRY device is composed of units shown above. At the right, engineers' diagrams show the power supply, scope and three switches as mounted separately. In contrast the . . .



BENDIX unit has power, scope and switches contained in one package with the switches located for scope. This also makes the Bendix device easily removable for use as the ground.

Evaluation Report

Engine Analyzers Gain Wider Acceptance

Past record makes them so necessary that military is specifying the devices for all new four-engine planes.

By George L. Christman

Engine and ignition analyzers are establishing in the equipment picture an indisputable measure of engine performance. Manuals of considerable importance the military attaches to the instruments are Air Force plans to equip all new production four-engine aircraft with analyzers. Emphasis is on planes carrying the PW/A 4400 engine. Initial implementation of this program are contracts recently awarded Sperry Gyroscope Co. and Bendix Magneto Division, Bendix Aviation Corp. The former, representing a five-fold production increase, would \$3 million, the latter \$500,000.

► **Military Installation**—Sperry units will equip such aircraft as B-56 and B-50 bombers. Bendix units will go on C-97 cargo and transport planes. Both manufacturers state that the Navy is showing a keen interest in analyzers for single and multi-engine aircraft.

Robert Boyer, Bendix senior sales engineer, says that the Navy is seeking a complete production installation on Marine P-4M patrol bombers and is studying Bendix units for use on single-engine carrier craft.

The importance of quickly analyzing engine trouble on a circular-lift plane is obvious, especially when enemy aircraft may be heard up working to take off. Boyer indicates that the Bendix portable airborne unit is particularly adaptable to lighter installation. He estimates equipment cost at \$20 per plane, increase in weight, a few pounds. The only requirements being a synchronizing bracket assembly, wire cable and one connector.

On the other hand Frank Boese, Sperry Applications Engineer who has had long experience with engine installations, points out that the Navy is obtaining excellent results with Sperry remote installations in Marine (B-1) and C-1.

► **Commercial Installation**—And the military is not the only believer in the worth of analyzers. Pan American World Airways, first commercial airline to make a last-side installation, (on Boeing Stratocruiser and Lockheed Constellation) orders set fully for the Sperry instrument (which one of its engineers developed) stating that it easily increases flight safety. Truly amazing for a Constellation with other analyzers are estimated at \$6000. Con-

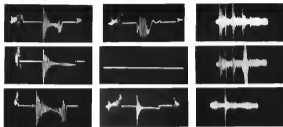
tinued Air Lines reports savings with the Bendix unit.

Several other commercial carriers are installing the Bendix and Sperry units. Among the freight carriers, the Flying Tiger has bought six Bendix instruments according to Boyer, for installation on C-47s.

Bendix, originally builder of portable analyzers have now launched an airborne unit (to be used on the C-97, for instance). The portable instrument is now known as a "portable airborne" unit because it can be used in the air then quickly detached and put to work on other air-transporters, for example.

► **Key Competition**—Sperry and Bendix are keenly competitive in the analyzer field, as they are in so many others, including automobile plants. But they agree that analyzers are essential to safe and economical aircraft engine operation.

To bolster its position, Bendix quotes three interesting observations: "In one typical month an airline had missed a great number of flights due to engine trouble. Subsequent tests . . . showed that 75 percent of these units were satisfactory and never should have been removed from the engine. Similar records showed that 94 percent of the (spark) plugs removed were good." "One airline estimated that its turnaround time was reduced 18 percent by



Come Distinct Patterns Such as These . . .

TOP—Normal ignition pattern of plug.
CENTER—A failed spark plug shows up.
BOTTOM—Exhaust out of synchronization.

TOP—No combustion in cylinder.
CENTER—Shorted primary condenser.
BOTTOM—Exhaust out of synchronization.

TOP—Normal vibration pattern of engine.
CENTER—How vibration looks on scope.
BOTTOM—Exhaust valve closing wrong.

using the (Bendix) analyzer."

► **Another** discussed the value of checking the actual condition of the ignition system before crossing the point of no return.

► **An** airline estimated total savings (due to analyzers) at approximately \$200 per month per airplane.

► **Sperry Specialist**—Ignition Voltage Control is a unique feature of the Sperry instrument. A variable delay mechanism, placed on the ignition post, allows a reduction of voltage supplied to the spark plug until it stops firing. This, says Sperry, "permits the mechanic to put into the future and spot trouble before they occur . . . he can actually predict the remaining life of the spark plug."

The new airborne Sperry analyzer instrument covers the following components:

► **Breaker assembly**. This device, used to trigger the horizontal sweep circuit appearing on the oscilloscope, consists of a single line can actuating an auxiliary breaker assembly. The contact unit consists of any center 1/2 engine condition scope accuracy drive.

Sperry runs over 50 are presently in service, maintenance has on any one is about 75¢. All having passed a 1000 h laboratory test, the manufacturer does not anticipate any maintenance difficulties and said should not require parts for 1 to 4 engine changes.

► **Radio interference filter**. This, finally made up of a choke coil and one or two condensers wired in parallel with the magnet primary condenser, is normally mounted by the firewall in the primary ignition circuit. It is not

needed because the analyzer's associated equipment is not radio shielded.

► **Relay-control box**. This component contains solenoid circuit for each engine ground wire and hermetically sealed relays to permit bypassing individual analyzers at will.

► **Panel assembly**. Control center for the analyzer. It contains an engine and condition selector switch, panel-mounted individual relay operation toggle switches for each engine and power switch with fuel and pilot light.

The analyzer is not installed in portable airborne installations. Instead, a lead storage battery is mounted in the aircraft to which the analyzer may be quickly connected when required.

► **Sperry Specialist**—Vibration diagnosis of the Sperry unit is: Weight—21 1/2 lb.; envelope dimensions—height, 19 3/4 in.; length, 7 1/2 in.; width, 11 1/2 in.; power source—115 v. single phase 60-400 cycle ac; power needs—100 w.

Boyer said that although the Sperry instrument is normally triggered by the engine-breaker breaker assembly, paper notes have been made to operate it from an induction pick-up or a three phase generator.

► **Scope**. Sperry—Sperry quotes as Air Materiel Command report which states that the 5 in. reflective scope uses a cathode ray, coupled with a horizontal grid control, "allows the pattern to be expanded to the operator's desire from providing continuous use of pattern interpretation. A complete system analysis can be conducted most rapidly with the Bendix equipment."

To meet the competitive Bendix Sperry pointed out that Bendix' "regulating

device, the heavier assembly, had not been proven operationally.

Moreover, Sperry states that, for airborne equipment, the 21 in. scope has proved to be completely adequate. A full scope individual cylinder pattern may be obtained at the back of a (twice) Added advantage is that the cathode tube will fit in a standard instrument outfit.

But Bendix claims that, because of design, simplicity and standardization cost of their analyzer is considerably less.

► **Sperry Specialist**—Sperry's Stern told Aviations Week that he considers the philosophy in to develop and market a complete system capable of providing every facet of personnel operation and maintenance. To do this, Stern says, vibration analysis is essential. The points are that there are engine failure usually in total destruction of the power plant is completely removed from 1940 h maintenance. He believes that to have a complete analysis of engine performance, the analyzer must read vibration and vibration and vibration data.

► **W. Wheeler** Sperry's engineering department head for engine instruments, adds that while four times as many engine problems in vibration problems to predict up for the analyzer, savings derived from vibration analysis are too many to be attributable to system analysis.

► **Development** the Sperry—The engine analyzer has its roots in detection vibration and load-measurements developed more years ago. Ignition analysis began in 1945 (the same year Bendix's

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SECRET ANALYZER in R-46, engine upper right.

efforts were directed along the same lines) and the first airborne installation of the instrument of the secret Sperry analyzer was made in the summer of 1945 as a Sperry model Lockheed Hudson.

After many experiments searching for the best way to trigger the pattern-apparatus, an five Sperry engine, working on a three-phase, engine-driven generator which locks the meter to a per detour: crankshaft angle. But any engine-driven accuracy is on more accurately synchronized to the crank shaft than the wear and resulting play in drive gear trains allow. So a brand new timing device was being studied to use of an object to the generator.

The experimental model of the "Camshaft Timing Pick-up" consists of a rotating armature which attaches inside the rear case of the engine to the end of the access, drive shaft. The pickup is supported by the pickup mounting bracket which bolts to mounting studs in the access section. Purpose is to create a precise reference signal to indicate crankshaft position. Through switching, the signal difference between the crankshaft timing pickup pole and any other engine-mounted event may be measured with an accuracy estimated at five times greater than any possible with the existing generator for any between armature and pickup at 100 in.

Expanding Analysis-In trying to create an accurate reference for the purpose in possible, Sperry engineers have included several new attachments for their analyzer. These, although now in operation in function, expand its detection ability with a measure of recognition and addition of output.

Two of these "gadgets," both in the experimental state, are instruments of variable reference pickup. They require no outside power source and work, but a few seconds. They are

• **Engine pickup.** The one unit pickup per engine is mounted in the torque of pressure line as close to the torque out as possible. Purpose is to measure rate of change of torque of pressure and present the information referenced to the position of the crankshaft.

Sperry engineers say it will locate timing cylinder and measurement due to other means when causing interference, because of the very rigid but relatively slight change of torque of pressure, due to. While the reference pickup's main job is to detect detour, line, valve malfunctioning, bent rods, etc., and in a cylinder-by-cylinder motion, the torque rate pickup probes what goes on at the crank-pusher shaft cycles.

• **Exhaust pressure rate change pickup.** This second variable reference unit is used in the exhaust system. One pickup will handle an average of five cylinders, depending on exhaust manifold configuration.

In primary function is to detect leaking exhaust valves and leak of gas between by exhaust pressure fluctuation. Sperry asserts that this unit will increase the versatility of its engine analyzer.

Another Sperry development is a portable Sperry analyzer and with continuous monitoring R-4600 engine. Only one hand-made unit exists today. Purpose is to check all functions of the analyzer without having to run up an engine.

Weight of the current unit is 27 lb and dimensions are 11 x 13 x 12 in.

The Sperry/Sperry competition for the analyzer market is long. And it will continue to be if Wheeler's proposition is true—namely that accurate and intelligent analysis of modern aircraft engine performance must depend on the use of electronic measuring instruments. Without them he says, trouble-shooting is still pretty much of a hit-and-miss business.

Aussies to Test New Flight Aids

(McGraw-Hill World News)

Melbourne—The Australian Department of Civil Aviation is supporting one of the latest electronic flight aids for testing.

One is the Bendix Elogis automatic electronic pilot which operates flying controls for blind landing. The other is a Sperry Zero Reader, a gyroscopic instrument which greatly simplifies instrument flying, especially during an approach to landing. This instrument is coming from England together with a gyrocompass and the necessary test equipment.

NEW AVIATION PRODUCTS



Jettisons Plane Load

Corps can be tied securely to the plane, then instantly jettisoned by means of a quick release and firing device placed on the aircraft by Gordon Brown & Associates.

Designed for use with "Browns-Load" tie-down equipment, the end fitting is built to accommodate tie-downs and can be used for quick release of drop tanks, emergency equipment, life rafts and other loads.

A latch-type unit, the quick release consists of pivoted toggle (1) which mechanically lock in the spread position (shown) to the fitting (2) below. Lifting the quick release arm (3) unlocks the toggle which then defers downward from weight of the load and pull through the center cable (4) in the fitting to disengage. The release can be manually operated through mechanical, hydraulic or electrical controls. Address: 497X Commercial Center St., Beverly Hills, Calif.



Capacitor Mounts

To help engineers overcome some of the shock and vibration problems encountered in mounting capacitors in military gear, Sprague Electric Co. has

produced new and diversified mounting arrangements for its line of schematic type, metal-cased paper capacitors.

Now being produced are beautifully-galvanized, type, threaded-wire capacitors. Other variants are capacitors with side mounting studs and isolated units. Also produced are units with brackets for horizontal or vertical mounting. Sprague says this is the first time the new mounting arrangements have been available as standard on its capacitors.

The firm also is marketing a new line of semiconductor capacitors designed to operate continuously at 125 C. The units are "Vitamin Q," an organic polymer capacitor impregnated and encased in its products, according to the firm. These capacitors are supplied in voltage ratings from 100 to 1000 v. dc in both inverted and extended lead construction. Address: North Adams, Mass.

Seals Plane Surfaces

"Syn-Cote," a tough plastic coating made especially to protect metal, wood and fabric surfaces on aircraft, now is available from Reactor Turbine Aeronautical Corp., Indianapolis.

The product is a non-flammable material that can be applied on surfaces to form a pliable, non-porous sheet which acts against corrosion and increases effects of weather. It will not crack, check or peel, according to Turner. That it still can be removed easily when damaged surfaces must be repaired.

Syn-Cote doesn't soften in oil and grease, gasoline, acids, salt water and solvents, says the company. It also acts against effects of sand and dust. A half gallon will cover the average lightplane, drying quickly in less than two pounds dried weight.

ALSO ON THE MARKET

Portable hydraulic pulber weighing less than 10 lb. develops 10,000 psi. "Twin-Twin" design permits it to be used in jobs previously accessible with this type of equipment, says maker, Overman Tool Co., 499 Cedar St., Overman, Minn.

"Fader" high-speed camera is 5, 10- and 15-mm. models, have lenses of high resolution, can be used for motion studies of mechanical, electrical and physical systems and vibrations. Components will take pictures up to 14,000 frames per sec., are made by Wollensak Optical Co., Rochester, N. Y.

LETTERS

Airship Recognition?

It must have been good news to the environmental world at general to read in your columns of Feb. 14, the announcement by that most important governmental and to scientists, the National Academy Committee for Assessment, of its appointment of some 400 members of 27 national committees for the current year, officially and

" ESPECIALLY IMPORTANT BECAUSE THEY CALLED FOR ARMED SERVICE TO THE NATION IN A TIME OF NATIONAL EMERGENCY.

And so, across the 17 consanguine tribes unobtrusively intended to cover the field of aristocracy comprehensively, even unhelpfully, might wistfully hope to find some recognition of their specialty since unhelpfully, at least once upon a time were linked up as members of the aristocratic family, and today do exist in the listed aristocrats of today the Navy has set up as the "line of aristocratic lineage."

But, even though long accustomed to both studied and colloquial indifference to nuance, it is nevertheless a bit disorienting to anticipate to see that this theoretical advance to anatomy hasn't directly or even by implication transgressed the field of anatomy to displacement itself, still so classically labeled "higher than us" by its name. Yet, "anatomy" and "displacement," both so different rather than of the same, are used to signify a new order in the world of the mind.

basely, of all authorities in the world, the NACA must recognize that sailplanes are not even remote cousins of winged aircraft, and only by wholly unrealistic standards should be judged with the latter.

Surely, if MACA must know that, since it is fully aware of the relative poverty of a nation devoted to such craft, that displacement aircraft, as well as winged as well, have not by any standard reached the pinnacle of their development and still should have available the best of technical know-how and facilities. To make otherwise, by not now, "in time of national emergency" affording them recognition by way of special technical help, while adhering to scruples and their limited personnel is nevertheless rather stupid or highly indifferent, and the MACA certainly is not the former.

Seen in the light of new governmental signals, the Navy program and anti-airships, isn't it only fair to the country which expects the best possible results from such work, that airships too get from other two-supported agencies also, the recognition and assistance to which personally all the country's aircraft are entitled from the pertinent government funds? Or, is there unfairness to see some readiness, understanding or policy that the funds entrusted to spending by the NACA, shall not only be wasted against

On the other hand, can it be that the one hand of the government doesn't know what the other is doing? Just where are we kidding by this confused sort of treatment of the subject. Could it be the in-

payor agent? Let's hope the public once gets interested enough to demand an honest look up at the third-party system.

C. E. ROSENBAUM
Playwright
Tues. 8:30, N. 1

Irregular Hours

Among the lights of "irregular" as current to some conditions and their many reasons why, they should have them, including the one that they can not handle rates and do without and aid, it is less wounded if they have been as magnificent as to by not the whole current.

Some of the disagreements with several of those newly published, their being called "irregular" or "unusual." They have few hard-and-fast rules, but they agree that they will take advantage of any opportunity that they appear almost completely in state of emergency, expending flight costs to make two separate legs without delay, thus retaining the same flight number. They also agree to know that they are setting up conditions of good financial and considerable personal risk to those who are loaded with the task. They are especially on guard against being in order to make five basic points, proposing that all members should log about 10,000 to 12,000 to Tokyo without delay. A 12-hour rest period at the maximum would fit the bill. They also agree that if they are to be successful, they would average 10 hours per leg with 2 hours flight planning and arrival before. Two rest periods of about 12 hours would be required. The use of a rest house was all that was just expected.

[illegible]

LEONARD G. FALLOTTE
1415 Foothill Blvd
San Leandro, Calif

Statistical Reformer

The author of the piece in your Feb. 7 issue, entitled "New Yorkback for Transportation Safety," seems much taken with the notion that violent deaths are as low as meaningful—statistically speaking—thus the normal remaining life expectancy of the average

It may be given to the satisfaction, but we middle-aged chaffers take a more sentimental view: we want to keep hanging on, so to speak.

If I understood the statistician's argument, an apology could grow a nose in microseconds on the short runway at LaGuardia, and claim that it doesn't matter so very much, because the old crowd is vanishing slowly, dissipating anyway, due to natural causes.

This novel approach to the problem of proving that air travel is safer than driving plus truck suggests some reforms in common law torts.

For example, if the airlines refused to sell tickets to anyone under 75 years of age, there would undoubtedly exist that hole in

Use luck with the statistical method of proving to Jones that his death is less painful and longer than Smith's, so that the utilitarian decision is enough. A character factor should be led into the composition. The sudden death of a someone is

I went with intent on advertising campaign for ATA, based on the new method of measuring success. The slogan is inevitable.

DON'T WORRY ABOUT RIDING IN
AIRPLANE - YOU'RE HALF DEAD
ALREADY

W F
Diplomata, Ps

[W. P. is an action writer—but not the editor of an action magazine, who has the same initials—Ed.]

Praise

Just a few words of appreciation and commendation for the splendid job you and your staff have done on the completion of your 15th annual inventory of Air Force which constituted your work of Feb. 15.

While the reader must admire the thoroughness of a well-timed interview staff, I would like to make specific reference to your persistence at the current helicopter interview. The writer I mentioned, Alex McIsaac, prepared the material based on a splendid analytical summary of the helicopter's history and present state of development indicating an expert insight into this, perhaps, one of the most important

As I am aware, the real issue is stated lost, but I believe your headline of this

Don Ryan Moore
Helicopter Counsel
Aircraft Industries Association
of America, Inc.
610 Shoreham Building
Washington, D. C.

We appreciated your article on Delta's Purchasing Department, which was prepared by Delta White of your Atlanta Bureau, and used in your Jan. 15 issue. That was an excellent article, a lot of it was

Engineered!

Don't guess on runway lighting; use

L-M Airport Lighting Engineering Service

The planning of an airport runway lighting system is vitally important. So L-M offers you a complete runway lighting engineering service.

L-M has been in the airport lighting business for many years. Its engineers know lighting. More important, they know what the pilot must see, and do, when he is coming in for a landing. The mission problems of a runway lighting system are even more important than the electrical and the optical problems.

L-M has an extensive staff of airport lighting engineers. Its field engineers throughout the country are backed up by experienced district lighting engineers. Back of them is a complete engineering staff of five engineers at headquarters.

The service includes analysis of the problem, planning, consultation, specifying of equipment that will meet the requirements and come within the budget, and the supervision of installation and operation.

Get This Engineering Data Check Sheet

Ask for L-M Field Engineer for this L-M Airport Runway Lighting Data Check Sheet or write Don McDaniel, General Manager, Airport Lighting Division, International L-M, Inc., 14000 Irving Company Building.

LINE MATERIAL... Airport Lighting

L-M's famous 150,000 rpm omnidirectional beam high intensity runway light type L-205.

L-M high-intensity 8001 with Guard Force type L-205.

L-M medium intensity runway light for smaller airports and for taxiways and aprons.

L-M medium beam, 30,000 L-21 and 30,000 L-22.

L-M medium and directional light single or double.

L-M small portable for large and small airports.

Here is some of the complete L-M Equipment for Small and Large Airports



Another PESCO FIRST...the Unloading Gear Pump ...flies with SAAB at transonic speeds

Lighter weight... longer service life... lower maintenance expense... smaller rental cost... these good reasons why Pesco's new unloading gear-type hydraulic pump is rapidly replacing conventional variable volume pumps on aircraft... particularly jets.

Among the first to take advantage of the many benefits of Pesco's latest contribution to more efficient, more dependable aircraft operation is the famous Swedish SAAB Aircraft Company. Its new B4AB-35, designed to fly at speeds up to the transonic speed range, depends on the Pesco Unloading Gear Pump for all hydraulic operations including landing gear, wing flap, brake operation, etc.

Always alert to the demands of aircraft modernization, Pesco's engineers are constantly

searching for ways to improve present equipment as well as develop new products to meet these important requirements.

It is this constant research that keeps Pesco aviation products standard equipment on military and commercial aircraft. If you have a problem in aircraft hydraulics or fuel handling, perhaps this experience can help you. A Pesco engineer will gladly discuss your problem with you... without obligation, of course.



Pesco Model 611799 Unloading Gear Pump. Weight 8.8 lbs. Hydraulic maximum operating pressure 1500 p.s.i. Capacity 2 g.p.m. at 1500 p.s.i. Features Pesco's exclusive, patented "Pressure loading" principle. Other models available for pressures to 3000 p.s.i.



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FINANCIAL

Components Firms Share Air Boom

Bendix Aviation and Thompson Products reports show increases for 1950 in total sales and profit.

Manufacturers of aviation components are participating fully in the so-called aircraft component boom. This is revealed by the annual reports released by two of the leading factors in this group—Bendix Aviation Corp. and Thompson Products, Inc. Results for the fiscal year ended Sept. 16, 1950, shows net sales and other operating income of \$178,410,794, the highest in its postwar history. The increase of \$16.7 million over 1949 sales is due largely to the gain in backlog for aviation products.

Sales of aircraft products in 1950 totaled over \$105 million or 49 percent of total volume as compared with \$66.3 million or 40 percent in 1949.

►Profit Up—Profit margins for Bendix increased to 7.7 percent of net sales for 1950 compared with 6.1 percent in 1949. Larger sales and improved profit margins are manifested in the 1950 earnings of \$14,528,118 or 50.80 a share compared with \$11,086,331 or \$5.24 per share for 1949. Earnings during 1949 were affected by an 11 week strike at the company's largest division. But 1950 had to absorb a higher total tax rate.

Bendix faced very well in settling its federal income and excess profits taxes for the war years 1949 to 1946 inclusive. The company had previously set up a tax provision of \$3,768,354 for a tax liability. Instead, it received a refund of \$1,056,971. In effect, it walked up in the present an aggregate of \$4,825,325, which was credited toward its tax liability.

The financial position of Bendix improved considerably during the past year. Net working capital amounted to \$13.7 million at Sept. 30, 1950 compared with \$75.3 million the year before.

At the same time, the equity of stockholders at Sept. 30, 1950 increased to \$16.6 million or \$47.95 per share. This represented an increase of more than \$11 million over the 1949 fiscal year-end.

For the 1949 period, Bendix paid out a total of \$4.75 per share in dividends. This represented around 60 percent of available earnings. Such a distribution is somewhat larger than that paid by the defense builders but a closer approximation to general industrial cor-

porate practice where established companies pay 50 percent.

►Aviation Interest—The company's most interesting interest is aviation development receives prominent mention in the annual report. Many divisions of Bendix are destined to be actively engaged in aircraft engineering and development in collaboration with the military services and manufacturers and users of such equipment. The engineering and production assignments are regarded as so connected with the production, control and operation of aircraft as well as the control and operation of both compressing and jet engines.

Among other things, the company states that its equipment is in growing demand for engine jet engine control, instrumentation and navigation systems for aircraft, "a growing number of order developments for both military and civilian use and problems in the rapidly developing field of guided missiles, rockets and pilotless aircraft."

During its past fiscal year, Bendix spent about \$24 million for engineering. This includes both company and government and government paid projects in "warfare field."

Total unfilled orders for Bendix at Sept. 30, 1950 were to about \$126 million compared with \$145 million a year earlier. The bulk of this increase occurred during the latter part of the fiscal year and was in aviation engineering and research project classifications. The company notes that "the amount of that type generally rises for an advance of delivery."

To meet its increased backlog, the company has embarked upon a new program of plant expansion and sub contracting.

►Thompson, Steady—Very much at the same time is revealed by Thompson Products, Inc. in its annual report for the year ended Dec. 31, 1949. Total sales last year aggregated \$121,512,553, against \$101,608,363 for 1949. Sales of aircraft products for 1949 were \$19,972,696, about the same as for 1949. But aircraft billings accounted for 46 percent of the total Thompson sales in 1950 and 46 percent of the total in 1949.

The management states that a comparison of the full year's figures on aircraft sales fails to give an adequate basis as to what has been happening in that

division. Due to reduced military appropriations, there was a decline in aircraft business during the early months of 1950. By contrast, the situation had changed radically and the government was keeping plans for greatly increased aircraft expenditures. As a result, the demand for aircraft components rose equally and Thompson has had to increase its capacity intensively for the production of these products. Also, too, as in the Bendix experience, note is made that there is always a lag between the receipt of orders and actual shipment. But, of course, however, began to climb during the latter part of 1949 and are expected to increase for many months to come.

Net earnings for Thompson were \$5,152,523 or \$7.51 per common share for 1950. This compared with \$6,014,745 or \$5.57 per common share in 1949.

Profit margins on net sales were 67 percent in 1950 and 64 percent in 1949. The management states that, showing to higher operating efficiencies, economies from the use of new and better equipment, improved plant layout and other measures.

►New Work—Further emphasis in Thompson's financial position is evident in the gain in working capital to \$13.7 million at the 1950 period as compared with \$10.2 million a year earlier. The net worth of the company shows an even greater gain, from \$16.5 million to \$47.4 million during that same period.

Dividends on the company's common stock, allowing for the previous stock split, were \$4.46 per share during 1950 as compared with \$1.25 for 1949. The 1950 distribution represents less than 20 percent of available earnings.

In what appears to be an attempt to anticipate any criticism of this dividend policy, the management states that reimbursement of a large part of earnings has become a necessity if investment means of industrial expansion at this time in the economy's stock equity is to be avoided. More than \$25 million of total earnings since 1935 are declared to have been accounted to meet plant expansion requirements.

Let capital components continue to represent a large part of the total aircraft sales of the company. Now aircraft products, however, are represented in gaining wide acceptance and accounting for a growing portion of shipments.

Bendix and Thompson are both important suppliers to the automotive industry. But the aircraft group appears to make further growth in 1951 billings and surplus 1950 sales in this category by a substantial margin for both companies.

—Selig Altschul



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for AIRCRAFT use

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Perfection in electronics

Short-Haul Prototype Legislation Asked

The Air Transport Assn. and local service airline consultant James Ray are pushing for a new aircraft prototype law. It would pay the design and construction of these new prototype planes—a jet transport, an airfreighter, and a 10-passenger short-hauler.

But only the short-hauler has any chance this year, most observers say. The Aircraft Industries Assn. and the Air Force both say the year would not be a fair year to start a civil transport design competition.

Because of the manufacturers' heavy military design and production schedule, if one manufacturer should take the time and devote the skill to winning a government-sponsored prototype contract now with such a start he would compromise the field for the next decade. Thus, AIA feels, it is not fair. And Air Force feels such a commercial effort at this time would dilute the military program.

The argument for pushing through a short-haul plane construction appropriation now is this: Airlines spending the obsolete DC-3 are losing \$15-\$20 million a year on the deal. But is the extra cost of running the DC-3 compared to a modern plane, ATA estimates. Transporters pay that less through mail pay subsidy.

It might cost only about seven or eight million dollars to build a new short-hauler prototype which, as yet, none the taxpayer \$15-\$20 million annually, short-hauler proposition again. The Air Force cannot officially back a short-hauler prototype bill now, having no specific requirement down up for the plane. But AF admits unofficially that it would buy some if they were built, there are many places the plane would fill a military need, is the way they put it.

So a short-haul aircraft prototype construction bill may possibly go through this year; it is yet to be seen and as its flight phase must meet a 10-year military presence on the manufacturers for orders.

Air Express Rates Go Up 20 Percent

Air express rates rose an average of 20 percent as Civil Aeronautics Board and the airlines were forced to handle to the Air Express division of Railway Express Agency.

The 24-centimeter mile increase is provided in the new Jan. 1 contract of REA with the airlines.

The airlines get none of the increased revenue.

Previously, on the average shipment,

airlines get 35 cents a ton mile, the REA 25¢/10 cents. Now the airlines still get 35 cents, but the REA gets 15 cents.

The rate increase should have little visible effect on volume in the present mobilization period. But under several economic conditions, estimates indicate they lose a 25 percent boost in shipping cost. As to division to air freight, little is likely, as the difference between the two services is so great. Air express now costs four times as much as air freight, while it formerly cost three times as much.

Last year, an express volume increased eight million ton miles—from 21 million in 1949 to 35 million in 1950, but it is a 19 percent gain. Air freight volume increased 21 million ton miles—from 94 million in 1949 to 115 million in 1950, a 22½ percent gain.

SHORTLINES

► **Air Express**—The 27,472 shipments of air express through New York the first week of March were 21 percent more than a year ago, compared with 32 percent. Month-of-February shipments totaled 138,233, 61 percent over 1949.

► **Air Transport Assn.**—ATA is its annual cruise line to CAB on behalf of Western and beyond mail rates, and if the Board confirms profits they made on sale of route 65, "it will be free service of a major airline to its complete voluntary route adjustments."

► **Air France**—French government-owned flag line is distributing a comic book promoting American tourist travel in France on the airline and through France on the French National railroads.

► **Braniff International Airways**—Braniff for year ended \$1,212,930—an all-time high for the line, and exceeding the four previous years' total. Domestic net profit of \$1,136,400 was added \$105,100 by the international operations net loss of \$135,100. Operating expenses of \$21,360,477 gained 104 percent while expenses increased only 7 percent.

► **Buffalo Municipal Airport**—American and Capital say they accept higher airport rates if they get a guarantee of needed improvements.

► **Continental Air Lines**—The 1950 net profit of the carrier was \$191,246—over five times that of the year before. The line operated 99.57 percent

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Effective April 6

New TWA offer

Luxurious air-sleeper service

"The Ambassadors"

The only air-sleeper flights overnight to **LONDON and PARIS** non-stop from New York

From the U.S. and overseas—you can depend on **TWA**

Now You See Them; Now You Don't

You may recall the single-headed little Antonov. When put up to stop the money flow, Air Force negotiated contracts and who got them. After a long campaign, we persuaded Air Secretary Youngman to let us print them. Then when Kees exploded, the lots were suppressed again. Security!

Another appeal to Secretary Fawcett and Undersecretary McCone brought out the lots again. We printed them. On Feb. 25 the lots were sent without the deficit figures. Congressmen who were negotiating contracts were misled, with the products sold, but not the contract amounts. A week or so later the contract lots arrived with the

SECRET. THESE ARE THE ONLY CONTRACTS THAT ARE NOT TO BE RELEASED TO THE PUBLIC. THE SECRETARY OF THE AIR FORCE HAS ORDERED THAT THESE CONTRACTS BE KEPT OUT OF THE PUBLIC EYE. THE SECRETARY OF THE AIR FORCE HAS ORDERED THAT THESE CONTRACTS BE KEPT OUT OF THE PUBLIC EYE.

amounts related. Then a week later the figures were coming again and they still are. This time it's the Mustangs. Bend has pulled the new contract across all negotiated contract purchases bought with your money and ours.

Mustangs Bend closes these figures left the money too much. In essence it is that to develop the deficit spent over on things described as "special weapons," "jetting power," and "air taking" gives precise information (as far as the Communists).

This, of course, is ridiculous. There must be some to it all this time. In Washington things are never at their best.

One plausible theory on this latest nonsense relied for "national security" is offered by our sister McGraw-Hill publications, Business Week. In Washington bureau says the Administration now claims that really honest in defense will be less than certain announcements have promised. The Administration's official policy is to get contracts out to many companies and thus "broaden the base" for defense production. The Administration theory is that this will set the stage for a quick about-face when and if he war. "It's a good idea, but it's running into snags," says BW.

The people who are talking are the armed services. Speaking up by order and speaking then around among unrepresented contractors takes time and runs up costs. To the services are waiting on being business with the contractors, arguing that that way, the government gets the most for its money.

Business Week notes the Administration's publicity has about speaking out contract information through Congress. That, field offices to small producers would know what and how much the government is buying. This tied into the base broadening idea.

But now, information is being withheld for "security." Policy is to give out no data on the size of contracts, for it will help the enemy. But it also tends to help big business' share, compared with small business. So congressional committees will take a look at Defense's measures.

The BW theory is given support by a little research. We have an official press release of Jan. 10 reporting that in the fiscal year ended June 30, 1950, "small business firms

received 75 percent of orders placed by the military services." The release proudly boasts that "many special contracts have been put into effect to make it easier for small business firms to find out what products are being bought, the locations of the offices buying them, and how to go about obtaining military contracts."

Who issued the beautiful press release? The same Mustang Board. It doesn't intend to give another such report—yet favors the data for services due to do so.

We are not prepared here to argue the relative merits of playing orders with small business or large business. Not do we care to print dollar amounts on the relatively low secret contracts where such figures would mean nothing to the Communists. But to eliminate all dollar figures on all negotiated contracts of all three services—or any one—on the excuse of national security is an insult to the public and the press. Looking some more Dean Meyers to set up operations behind secret contracts can be a threat to national security too. The contract lists should be open and above board.

We hope Congress looks into the subterfuge and orders the Mustang Board to forget politics—in this particular situation, anyhow.

'No Vested Right to the Mail'

Postmaster General Donahoe follows up his department's recent announcement that more mail will be taken off trucks and put on tracks with this elegant statement of intent and policy:

"An integrated transportation system serves the public interest and is less costly to the government, which in turn, saves tax cost to the taxpayer."

"That means that there is no vested right to the mail traffic by any single form of transportation. No industry has a natural right to the business."

"It is the plan of the Post Office Department first to the extent the U.S. mails will be carried quickly and cheaply by the medium of transport best suited to do the job. . . . We can no longer permit the welfare of a railroad or of the necessity of a river to be the single determining factor in transportation. By other means of suitably reduced costs to the Post Office . . . can be obtained."

Long Beach Builds the C-124

At least three times in the past—most recently Mrs. Eleanor Roosevelt—has been correctly reported that the Douglas C-124 transport is built at the Douglas Santa Monica plant. Writing *Stamps*, public relations manager of the Long Beach division, says our employees of doubt "cast us out of the Long Beach domain to the quick."

He adds that the C-124 was "conceived, born, and is being built here at the Long Beach division with the exception of motor wing panels and tail skin subcontracted to Santa Monica." The probably recent saying to the public which has no interest in disabuse between our divisions. But we do have a healthy spirit of corps and like to get recognition for our accomplishments. Do you mind holding us back up our heads in the future?

We are sorry. It isn't considered smart in prohibition to copy-paste one's mistakes. But our competitors publicize them, too, so let them remain respectfully quiet while we content to the one of ours. We hope never to repeat it.

We want the world to know that Long Beach builds the C-124.

—Robert H. Wood

Bendix Products Division

FIRST IN FUEL METERING



Helping American Aviation Lead the World

American remarkable progress during the past quarter of a century, together with the growing complexity of aircraft design, have created unworkable new problems in fuel metering and landing gear—many so challenging that only the great creative skill of Bendix Products has been equal to the task.

In meeting these many problems as they arise, Bendix Products has assembled the finest engineering talent and the most modern and comprehensive machinery in the industry—a fact reflected in the recognition of Bendix today as the nation's outstanding source for these vital flight components.

Engine builders and airplane manufacturers are urged to let the proven combination of skill and experience solve their fuel metering and landing gear problems.

BENDIX PRODUCTS SOUTH BEND DIVISION

Engine Builders International Division, 72 Park Avenue, New York 17, N. Y.

LEADER IN LANDING GEAR



Fuel metering that
for jet engines



Landing gear for
jet engines



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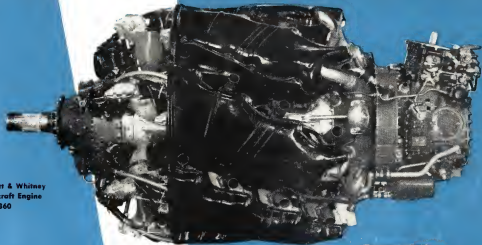


Landing gear
fuel metering gear



Landing gear
fuel metering gear

Pratt & Whitney
Aircraft Engine
R-4360



Pratt & Whitney
Aircraft Engine
R-2800



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More horsepower produced by engines of lighter weight and more compact design.

This demand of aircraft engineers is met in the mighty Pratt & Whitney Aircraft Engines that power such a large percentage of planes for our military force and commercial air lines.

Incorporated in these engines are gears produced by Foote Bros., gears that must be light in weight, of compact design, and yet must operate at pitch line velocities that can be measured in miles per minute.

Manufacturers of aircraft and aircraft engines look to Foote Bros. for gears and power transmission equipment today, just as general industry has looked to Foote Bros. for gears and powered transmission equipment since 1859.

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